

Claims

1. A method for handling service failures in a communications network comprising a user equipment, a first network element and a serving network
5 element, the method comprising the steps of:
receiving at the first network element a first message from the user equipment;
transmitting the first message from the first network element to the serving network element;
10 detecting at the first network element that the serving network element is out of service;
determining at the first network element the type of the first message; and
in dependence on the type of the first message sending from the first network element to the user equipment an error message including an indication
15 that the serving network element is out of service.
2. A method according to claim 1, comprising the further step of:
receiving at the user equipment the error message.
- 20 3. A method according to claim 2, further comprising the step of:
subsequent to receiving the error message at the user equipment, sending a second message of a second type different from the type of the first message to initiate a registration from the user equipment to the first network element.

4. A method according to any preceding claim, wherein the method further comprises prior to receiving at the first network element a first message from the user equipment the step of:
- 5 establishing a bearer for signalling between the user equipment and the communications network.
5. A method according to claim 4, comprising the further steps of selecting a further serving network element and forwarding the message to the further serving network element.
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6. A method according to claim 5, wherein the method comprises the further step of: registering at the further serving network element the user equipment.
7. A method according to claims 4 to 6, wherein the bearer for signalling is a
- 15 signalling or general purpose PDP context.
8. A method according to any previous claim wherein the communications network is an Internet Protocol multimedia subsystem (IMS) network.
- 20 9. A method according to any previous claim wherein the first network element is an Interrogating Call Session Control Function (I-CSCF).
10. A method according to the claim 1, wherein the first network element is a Proxy Call Session Control Function (P-CSCF).

11. A method according to any previous claim wherein the serving network element is a Serving Call Session Control Function (S-CSCF).
- 5 12. A method according to claim 1, wherein the step of determining a type of message comprises determining the type of message based on the content of a predefined information element in the message.
13. A method according to claim 1, wherein the step of detecting at the first
10 network element that the serving network element in a communications network is out of service, comprises the step of:
- detecting that a predetermined time period has passed since the forwarding of the message from the first network element to the serving network element and before a response has been received from the serving network element and/or
15 determining that the first message has been transmitted a predetermined number of times.
14. A method according to claims 1 to 13, wherein the type of the first message is a re-registration request.
- 20 15. A method according to claims 1 to 14, wherein the type of the second message is an initial registration request.

16. A method according to any of claims 12 and 13, wherein the information element indicates that the request is sent integrity protected.
17. A method according to any of claims 12, 13 and 16, wherein the information
5 element indicates that the user has been successfully authenticated.
18. A method according to claims 12, 13, 16 and 17, wherein the information element in the message is an integrity protected flag in an Authorization header of the message.
- 10 19. A network element in a communications network further comprising a serving network element and a user equipment, wherein the network element is arranged to:
- receive a first message from the user equipment;
 - 15 forward the first message to the serving network element;
 - detect that the serving network element is out of service;
 - determine the type of the first message; and
 - in dependence on the type of the first message received from the user equipment send an error message to the user equipment.
- 20 20. The network element according to claim 20, further arranged to receive a further message of a second type different from the type of the first message from the user equipment.

21. A user equipment in a communications network further comprising a first network element and a serving network element, wherein the user equipment is arranged to receive an error message from the first network element, the error message indicating that the serving network element for the user equipment is out of service, and respond to the error message by sending a further message of a second type different to the first type to the first network element.

22. A user equipment according to claim 21, further arranged to establish a bearer for signalling between the user equipment and the communications network and further arranged to respond to the error message by dropping the bearer for signalling between the user equipment and the communications network.

23. A user equipment according to claim 22 wherein the bearer for signalling is a signalling or general purpose PDP context bearers.

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24. A user equipment according to claim 21, wherein the type of the further message sent to the first network element is an initial registration request.

25. A user equipment for operation in a communications network comprising a first network element, the user equipment being arranged to determine that the first network element is out of service by sending a request to the first network element and determining that no response has been received from the first network element; wherein the user equipment is arranged on determining that the first network element is out of service, to

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- drop a bearer for signalling between the user equipment and the communications network,
- discover or select a new a further first network element, and
- send to the further network element a message comprising an initial request
- 5 for registration at the communications network.

26. A method for handling service failures in a communications network, the communications network comprising: a user equipment; a first network element; and a further network element, the method comprising the steps of:
- 10 sending from the user equipment to the first network elements a first message;
- detecting at the user equipment that the first network element is out of service;
- dropping the signalling bearer from the user equipment to the
- 15 communications network;
- selecting or discovering at the user equipment the further network element;
- sending from the user equipment to the further network element a message comprising an initial registration request.

- 20 27. A method for determining a type of registration in a communications network comprising at least a user equipment and a network element, comprising the steps of:
- receiving at the network element a request for registration from the user equipment;

detecting at the network element an information element in the received request;

determining the content of the information element, and in dependence on the determined content of the information element determining whether the
5 registration request is a first type of registration or a second type of registration.

28. A method according to claim 27, wherein the communications network further comprises at least one serving network element and the method comprises the further steps of:

10 transmitting the request from the first network element to the serving network element;

detecting the service network is out of service by receiving no response from the serving network element,

15 sending an serving network element out of service message to the user equipment, if the registration request is the first type of registration request,

selecting a further serving network element by the first network element if the register request is for the second type of registration.

29. A method according to claim 27 or 28, wherein the first type of registration is
20 a re-registration and the second type of registration is an initial registration.

30. A network element in a communications network further comprising a user equipment, wherein the network element is arranged to:

receive a request for registration from the user equipment;

detect an information element within the received registration request;

determine the content of the information element, and in dependence on the determined content of the information element to determine whether the received registration request is a first type of registration or a second type of registration.

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31. A network element according to claim 30, wherein the information element indicates that the request is sent integrity protected.

10 32. A network element according to claims 30 and 31, wherein the information element indicates that the user has been successfully authenticated.

33. A network element according to claims 30 to 32, wherein the information element in the message is an integrity protected flag.

15 34. A communications system comprising a network element as claimed in claims 19, 20 and 30 to 33, and a user equipment as claimed in claims 21 to 25.